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UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 657

Contribution from the Bureau of Chemistry
CARL L. ALSBERG, Chief

Washington, D. C. PROFESSIONAL PAPER. May 2, 1918

A WHEATLESS RATION FOR THE RAPID INCREASE OF FLESH ON YOUNG CHICKENS.

By M. E. Pennington, *Chief*, H. A. McAleer, *Investigator in Poultry and Egg Handling*, and A. D. Greenlee, *Assistant Chemist*, assisted by A. W. Broomell, *Assistant Chemist*, L. E. Harker, *Aid in Poultry and Egg Handling*, and H. L. Shrader, *Investigator in Poultry and Egg Handling, Food Research Laboratory.*

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THE WHEATLESS RATION for the commercial or coop fleshing of young chickens for market discussed in this bulletin offers to commercial feeders a singularly efficient and economical ration for the rapid increase of chicken flesh. This ration, composed of corn meal, dried distillers' grains (corn), and fresh buttermilk, was fed again and again throughout the whole feeding season, and produced in 14 days' coop feeding an average gain of a pound for 7.91 pounds of wet feed consumed, or 4.63 pounds of solids. The employment of distillers' grains makes this ration of especial importance to feeding plants accessible to distilleries engaged in producing commercial alcohol from corn.

The tests reported were made under commercial rather than farm methods of feeding poultry. The aim of the commercial feeder is to increase the flesh of young birds rapidly and economically in a brief period after they are received from the farms. This necessitates the use of feeding coops which allow the chickens little exercise and the regular and abundant feeding of the birds under clean conditions. It calls for special equipment and for use of time and employment of labor to a degree not possible on most farms.

In order that full benefit from the flesh added rapidly by special feeding may be realized, it is necessary to slaughter the chickens immediately and dry pick and chill them without delay. It has been

found that soft meated live chickens in transit lose flesh rapidly and that wet picking, scalding, or chilling birds in water, the methods usual in farm preparation, waste substance and lessen the flavor and the keeping quality of the birds. For these reasons it is rarely profitable for a farmer to coop fatten, or finish chickens at home and ship them alive or as farm dressed poultry for distant markets. As a result, more and more young chickens are being collected at central feeding stations (fig. 1, Pl. I), there to be fleshed quickly for market, and slaughtered, dressed, chilled, and shipped without intervening loss of flesh or flavor. The fleshing stations vary in size from those with a capacity of 30,000 to those holding 1,000 head, depending upon the size of the packing house attached. It is believed that final coop finishing for market under certain conditions will offer returns as a centralized cooperative activity for a group of farmers producing an important aggregate of chickens each season.

COMPOSITION OF RATIONS USED.

It is possible to produce high quality flesh for food purposes very rapidly and at comparatively small expense by feeding chickens a suitable ration under appropriate conditions. Various rations based upon grain mixtures wet with water or buttermilk have been used by commercial feeders. The grains most commonly used are mixtures of corn and wheat. To these are added oats and occasionally barley. One of the rations to be discussed in this bulletin includes distillers' grains, which have not been used to any extent in chicken fleshing. Rations composed of corn meal and buttermilk, and of corn meal and water have been fed simultaneously with the corn meal, distillers' grains, and buttermilk. The comparative efficiency of the three rations is given in the following pages.

Composition of Rations.

	Pounds.
Ration A:	
No. 3 whole corn, ground to a fine meal	100
Water	127
Ration B:	
No. 3 whole corn, ground to a fine meal	100
Fresh buttermilk	150
Ration C:	
No. 3 whole corn, ground to a fine meal	75
Dried distillers' grains (corn)	25
Fresh buttermilk	150

When dried buttermilk is used 10 pounds of the powder should be added to 90 pounds of water. Ration C is thicker in consistency than the ration commonly fed. It should not be thinned, as is the tendency among feeders using it for the first time.

A chemical analysis of these feedstuffs and of the compounded rations showed the compositions indicated in Table 1. These results are the mean analyses of six lots of corn meal and two lots

of distillers' grains used during the fleshing experiments. The buttermilk was examined daily for acid and total solids.

TABLE 1.—*Chemical composition of the feedstuffs and the rations used in the poultry fleshing experiments.*

	Corn meal.	Buttermilk.	Distillers' grains.[1]	Rations.		
				A.	B.	C.[2]
Moisture (per cent)	12.22	91.77	7.98	60.94	59.95	59.53
Total solids (per cent)	87.78	8.23	92.02	39.06	40.05	40.47
Fat (per cent)	3.85	.52	12.30	1.71	1.85	2.70
Total nitrogen (per cent)	1.40	.46	4.24	.62	.84	1.22
Protein (per cent)	8.75	2.96	26.50	3.88	5.28	7.05
Ash (per cent)	1.38	.86	4.57	.60	1.07	1.39
Crude fiber (per cent)	2.16	.....	8.14	.96	.86	1.46
Lactose and lactic acid (per cent)	.....	3.89	.....	.....	2.33	2.33
Nitrogen-free extract (per cent)	.....	.....	.....	31.91	28.66	25.54

[1] Average composition of lots 2 and 3.
[2] Average composition of ration prepared with lots 2 and 3 of distillers' grains.

It will be observed that the total solids in the three rations are approximately the same, the maximum variation being 1.41 per cent. There is 2.70 per cent of fat in Ration C, and the ash and protein contents are also distinctly higher. The amount of protein is especially noteworthy because it is the aim in this work to produce a flesh of desirable food composition, which implies a "fleshing" rather than a "fattening" and a deposition of fat in the edible portions of the bird rather than around the viscera. The higher content of mineral ash is in accord with the results obtained in recent nutrition investigations. Attention should be called to the fact that part of the protein in the distillers' grains is in the yeast cells which remain after the alcohol is removed by distillation. During the course of this work it has also been found that the distillers' grains on the market vary widely in composition, as may be seen from Table 2 which gives the analyses of four lots purchased at different times from the same firm.

TABLE 2.—*Chemical composition of distillers' grains.*

	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Average.
Moisture (per cent)	6.51	4.98	10.97	8.65	7.78
Total solids (per cent)	93.49	95.02	89.03	91.35	92.22
Fat (per cent)	10.47	15.97	8.62	8.82	10.97
Total nitrogen (per cent)	5.31	4.40	4.07	4.08	4.47
Protein (per cent)	33.18	27.50	25.44	25.50	27.94
Ash (per cent)	3.42	4.45	4.68	4.12	4.17
Crude fiber (per cent)	10.71	8.14	8.14	8.35	8.84

CHARACTER OF BIRDS FED.

The observations reported were made on young chickens of the class commonly known as "broilers." When received from the farm the weights varied from $\frac{3}{4}$ pound to $2\frac{1}{2}$ pounds, with an average

of $1\frac{7}{10}$ pounds. Very few were pure bred, but practically all had a predominant utility breed strain. Barred Rock blood was the most common. Birds showing markedly low vitality or deformity or sickness were excluded, but a commercial liberality was exercised in selecting stock for the feeding cages. Such a selection is advantageous when feeding large numbers of birds, and should be practiced as a part of routine management. Birds which are not adapted to gain weight ordinarily lose weight, regardless of the care given; hence to feed them is a loss to all concerned. They should be slaughtered as soon as received.

As a general rule the nearer the poultry packing house feeding station is to the farm, the better. A haul, generally by train, is, however, often necessary in the transfer of feeder stock from the farm to the feeding station. Accordingly, all the birds used in these experiments were subjected to a haul requiring from a few hours to more than 24 hours. The birds were selected as promptly as possible after arrival, placed in the feeding cages, and fed corn meal and buttermilk for 24 hours, to eliminate stuffed crops, undue thirst, and restlessness, before beginning to feed the three experimental rations.

The cages were entirely of metal, with compartments for individual birds, and feed cups so constructed that the splashing of the thin feed was impossible. In essentials they were comparable with the feeding batteries in commercial use, one of which is shown in figure 2, Plate I.

TOTAL GAINS IN WEIGHT.

All the birds were fed for 14 days. To determine the rate of gain, the birds were weighed on the first, fourth, eleventh, and fourteenth days. The results in detail are shown in Table 3, in which 13 experiments, comprising from 30 to 42 birds each, are summarized. The experiments were begun in May, and were repeated until October, that the climatic conditions might have their usual effect on the birds. Each group of birds is designated in accordance with the ration received as A, B, or C, respectively.

TABLE 3.—*Summary of changes in weight of 100 head of young chickens.*

	Ration A.	Ration B.	Ration C.
Initial number of chickens	100	100	100
Period of fleshing (days)	14	14	14
Death loss (per cent of initial number)	2.4	0	0
Initial live weight (pounds)	172.1	169.7	171.1
Final live weight (pounds)	180.7	221.3	231.0
Total gain in live weight:			
Difference between final and initial live weights (pounds)	8.6	51.6	59.9
Calculated as per cent of initial live weight	5.00	30.41	35.01
Dressed weight (pounds)	162.7	199.0	207.3
Chilled weight (pounds)	161.8	197.7	205.8
Average initial live weight (pounds)	1.7	1.7	1.7
Average final live weight (pounds)	[1] 1.9	2.2	2.3
Average dressed weight (pounds)	[1] 1.7	2.0	2.1
Average chilled weight (pounds)	[1] 1.7	2.0	2.1

[1] Average weight of the surviving chickens.

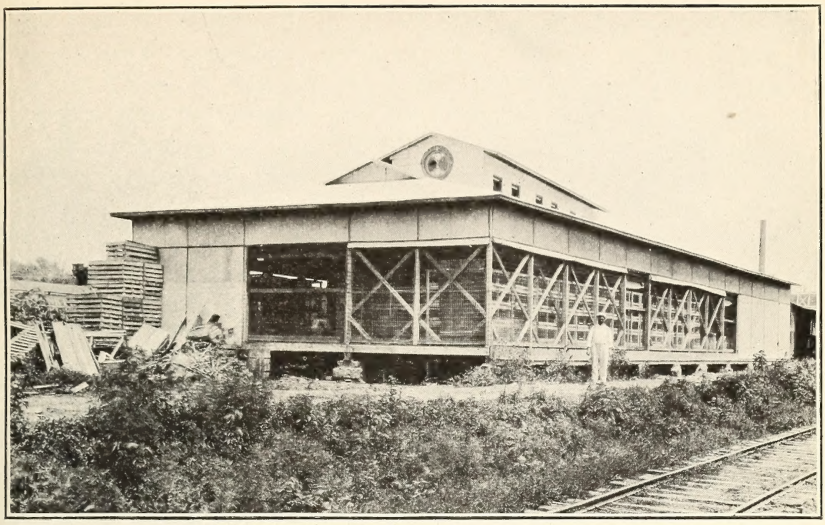

FIG. 1.—TYPICAL SMALL FEEDING STATION.

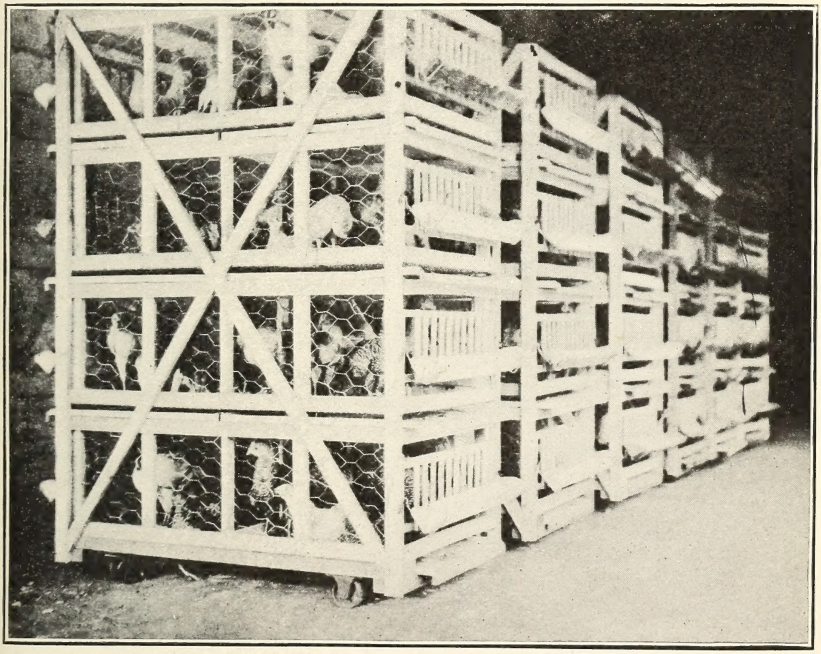

FIG. 2.—FEEDING BATTERIES.

The total initial weight of all the birds when feeding began is comparable with the "initial live weight" of the commercial feeder, and the total live weight of all the birds when ready for slaughter is comparable with the "final live weight" of the commercial feeder. The difference, in pounds, between the "in" and "out" weights is given in Table 3. For example, the "in" weight of 100 birds on Ration C was 171 pounds and the "out" weight 231 pounds, or a gain of 60 pounds to the 100 head. For broader usefulness the results have been expressed also as percentage of gain, taking the initial live weight as the basis of comparison. Ration A, corn meal and water, gave a total gain of only 5 per cent; Ration B, corn meal and buttermilk, gave a gain of approximately 30 per cent; while Ration C, corn meal, distillers' grains, and buttermilk, gave a gain of about 35 per cent.

QUANTITY OF FEED REQUIRED.

It is essential that the ration used for fleshing chickens be palatable to them. Birds will starve rather than eat a distasteful feed. The experiments have shown that Ration C is eaten eagerly and the birds do not tire of it. The appetite at the end of the experiment was even better than at the beginning, quite the reverse of the usual condition. The birds ate more, by weight, of Ration C than of either Ration A or B, as is seen in Table 4. At the end of 14 days 378 pounds of Ration A, 458 of Ration B, and 474 of Ration C had been consumed.

TABLE 4.—*Feed consumed by 100 head of young chickens.*

Feeding period.	Feed.	Ration A.	Ration B.	Ration C.
Days.		*Pounds.*	*Pounds.*	*Pounds.*
4	Grain	47.8	48.8	49.1
	Buttermilk (10 per cent solids)	.....	73.2	73.6
	Water	59.7	.....	.....
	Total feed	107.5	122.0	122.7
8	Grain	97.7	102.1	103.4
	Buttermilk (10 per cent solids)	.....	153.2	155.2
	Water	121.8	.....	.....
	Total feed	219.5	255.3	258.6
11	Grain	133.9	143.3	146.9
	Buttermilk (10 per cent solids)	.....	214.9	220.3
	Water	167.1	.....	.....
	Total feed	301.0	358.2	367.2
14	Grain	168.1	183.2	189.4
	Buttermilk (10 per cent solids)	.....	274.7	284.2
	Water	209.6	.....	.....
	Total feed	377.7	457.9	473.6

Under any circumstances the amount of feed eaten is very much greater than the amount of flesh produced, because a large part of the food of an animal must be used to keep it warm and maintain the body functions. The excess eaten may or may not be deposited

as flesh, depending upon the character of the ration and the animal. It is the aim, when feeding to produce flesh, to deposit in that form as much as possible of the ration fed.

TABLE 5.—*Pounds of feed per pound of gain in live weight.*

Feeding period.	Feed.	Ration A.	Ration B.	Ration C.
Days.		*Pounds.*	*Pounds.*	*Pounds.*
4	Grain	16.08	3.28	3.08
	Buttermilk (10 per cent solids)		4.93	4.61
	Water	20.06		
	Total feed	36.14	8.21	7.69
8	Grain	27.56	3.34	3.16
	Buttermilk (10 per cent solids)		5.01	4.74
	Water	34.37		
	Total feed	61.93	8.35	7.90
11	Grain	17.64	3.40	3.10
	Buttermilk (10 per cent solids)		5.09	4.66
	Water	22.00		
	Total feed	39.64	8.49	7.76
14	Grain	19.54	3.55	3.16
	Buttermilk (10 per cent solids)		5.33	4.75
	Water	24.37		
	Total feed	43.91	8.88	7.91

Table 5 shows that of Ration A 43.91 pounds were required to produce a gain in weight of 1 pound. Of Ration B, 8.88 pounds were required, and of Ration C, 7.91 pounds. Expressed differently, it may be said that only 2.28 per cent of the wet feed of Ration A was retained in the form of chicken flesh, while 11.26 per cent of Ration B was so retained, and 12.64 per cent of Ration C (Table 6).

TABLE 6.—*Percentage of wet feed retained as gain in live weight.*

Feeding period.	Ration A.	Ration B.	Ration C.
Days.	*Per cent.*	*Per cent.*	*Per cent.*
4	2.77	12.18	13.00
8	1.61	11.97	12.66
11	2.52	11.77	12.88
14	2.28	11.26	12.64

RATE OF GAIN.

Practical experience has led many of the commercial chicken feeders of the United States to feed young birds for a 14-day period. Sometimes a shorter period is substituted, some feeders claiming that the rate of gain decreases steadily in the second week. An analysis of the data obtained during these experiments shows that in Ration B there is a decrease in the amount of flesh deposited as compared with feed consumed, 8.21 pounds of feed per pound of gain being required during the first four days and 8.88 pounds during the last four days of the 14-day period (Table 5). This does not hold, however, for Ration C, which gives an evenly continuous utilization of feed

throughout the entire 14 days and a deposition of flesh which is practically uniform. It is probable, also, from additional observations which are not sufficiently numerous to tabulate, that gains in weight and good appetites are maintained with Ration C for a period much longer than 14 days. Whether a longer period than 14 days is profitable remains to be determined. The results at hand, however, indicate that young birds should be fed at least 14 days if profitable results are to be obtained.

LOSS IN WEIGHT DUE TO KILLING AND CHILLING.

The practical feeder is frequently called upon to decide whether his fleshing gains are sufficient to be profitable. To do this he must know not only the live weights before and after feeding, but the final weight after dressing and chilling, since it is on the basis of the latter that his sales are made. The losses due to the removal of blood and feathers and the loss by evaporation during cold air chilling are shown in Tables 7 and 8.

The birds designated "before fleshing" in Table 7 were selected at the same time and from the same stock as the birds to be fed. They were killed at once and the carcasses studied as described on page 8. The shrinkage due to dressing was also determined.

TABLE 7.—*Loss in weight on killing and chilling young chickens, before and after fleshing.*

	Ration.	Blood.	Feathers.	Loss on chilling.	Total shrinkage in killing, dressing, and chilling.
		Per cent of final live weight.			
Before fleshing		4.1	5.7	0.7	10.50
After fleshing	A	3.5	6.4	.6	10.46
	B	3.9	6.2	.6	10.67
	C	3.9	6.3	.7	10.92

It will be seen from Table 7 that feeding stimulates feather growth, a fact well known to the practical man. It is difficult to determine exactly the amount of blood which the chicken loses, but the figures presented may be taken as fair. While there is but little difference between the slaughter losses of fleshed and ranger chickens, the former probably lose a little more weight. Of the birds considered in these experiments, those fed Ration C lost a little more weight than their companions on Ration A or B.

Such being the case, a further analysis becomes necessary to determine the relation of this loss to the ultimate weight of chicken ready for the consumer. These figures, which are presented in Table 8, indicate that the 0.25 per cent increase in dressing loss is more than compensated for by the 3.77 per cent greater gain in total weight remaining when Ration C is used. Table 8 shows also the

actual increase in weight remaining to the packer after dressing and on which he must calculate the cost of feeding. For the Rations A, B, and C this is −5.98, +16.50, and +20.27 per cent, respectively, of the initial live weight. The size of the bird must also be considered when calculating the slaughter loss. The foregoing figures are based on birds which showed a dressed weight between 2 and 3 pounds. Birds weighing over 3 pounds, dressed weight, have an increased slaughter loss of from 1 to 2 per cent.

TABLE 8.—*Relation between gain in live weight and total shrinkage (young chickens).*[1]

	Ration A.	Ration B.	Ration C.
Initial live weight (pounds)	100.00	100.00	100.00
Weight gained by fleshing (pounds)	5.00	30.41	35.01
Final live weight (pounds)	105.00	130.41	135.01
Total shrinkage (per cent of final live weight)	10.46	10.67	10.92
Weight lost in total shrinkage (pounds)	10.98	13.91	14.74
Weight gained by fleshing, less total shrinkage (pounds)	−5.98	16.50	20.27

[1] These calculations are based on the average gain in live weight (Table 3) and the average total shrinkage (Table 7) obtained with each ration.

RELATION OF INITIAL WEIGHT TO FINAL GAIN.

The birds used in these experiments averaged 1.7 pounds when they entered the feeding cages. The birds after fleshing weighed on an average 2.2 pounds for Ration B and 2.3 pounds for Ration C. Included in these averages, however, are initial live weights varying from 0.875 pound to 2.5 pounds, and final live weights varying from 1.2 pounds to 3 pounds. The best results were obtained with birds having an initial live weight of 2 pounds or less. Birds over 2 pounds made profitable gains, but showed an irregularity which was less apparent in the younger stock.

TABLE 9.—*Résumé of the change in weight by individual broilers during fleshing for 14 days.*

	Ration A.	Ration B.	Ration C.
Percentage of broilers with gain of—			
Less than 10 per cent of initial live weight	34.68	4.03	0.81
10 per cent or more of initial live weight	44.36	91.93	95.94
20 per cent or more of initial live weight	7.26	79.03	87.00
30 per cent or more of initial live weight	.81	58.06	65.86
40 per cent or more of initial live weight	.....	29.03	39.84
50 per cent or more of initial live weight	.....	9.68	22.77
60 per cent or more of initial live weight	.....	2.42	7.32
70 per cent or more of initial live weight	.....	.....	2.44
Percentage of broilers with loss of—			
Less than 10 per cent of initial live weight	15.32	2.42	1.63
10 per cent or more of initial live weight	5.65	1.61	1.63
20 per cent or more of initial live weight	4.04	.....	.....
30 per cent or more of initial live weight	3.23	.....	.....
40 per cent or more of initial live weight	3.23	.....	.....
100 per cent of initial live weight (died)	2.42	.....	.....
Total number of broilers	124	124	123
Percentage gaining	79.03	95.97	96.75
Percentage losing	20.97	4.03	3.25

Table 9 summarizes the variation in the gain of individual birds on Rations A, B, and C. This summary brings out in striking fashion the relative value of Ration C, and also shows the need of a careful study of individual birds to determine those types which lend themselves to fleshing. For example, the type of bird which on Ration C gained over 60 per cent of its own weight would be vastly more profitable to feed than the type which is limited to 10 or 20 per cent gains. It is encouraging to note, however, that 96.75 per cent of the birds on Ration C gained weight, and 95.97 per cent on Ration B, while only 79.03 per cent on Ration A showed gains.

COMPOSITION OF BROILING CHICKENS BEFORE AND AFTER FLESHING.

If the rapid increase of flesh on chickens is to be of maximum benefit it must include a gain to the consumer in both quality and quantity of foodstuff, as well as additional profit to the feeder and packer. It is very desirable, also, that some definite knowledge be obtained concerning the relation between diet and flesh composition, that animal flesh, like fruits and vegetables, may have a composition adjusted to the market requirements to which it is to be subjected. The relation between the amount of edible and inedible material in the carcass is also a matter of economic moment.

TABLE 10.—*Gross composition of young chickens, before and after fleshing.*

	Ration.	Total edible portion and crude gizzard fat.						Bones.	Offal.	Number of birds dissected.[1]
		Total edible portion.				Gizzard fat (crude).	Total.			
		Meat.	Skin.	Edible viscera.	Total.					
		Per cent of chilled weight.								
Before fleshing		39.0	7.4	7.3	53.7	1.5	55.2	17.7	27.1	78
After fleshing	A	38.6	8.4	6.8	53.8	3.8	57.6	17.2	25.3	41
	B	39.6	9.0	6.6	55.2	3.9	59.1	16.4	24.6	41
	C	40.3	8.2	6.6	55.1	3.2	58.3	16.4	25.3	41

[1] The chickens were dissected in groups, each of which included from 3 to 6 birds.

Table 10 compares the gross composition of ranger chickens, just as they come from the average farm, with similar chickens fed in the feeding station for 14 days on Rations A, B, and C, respectively. A study of the data recorded indicates that apparently a number of changes in gross composition are due to feeding. For example, the amount of meat has been increased from an average of 39.0 to 40.3 per cent, while the total edible portion has been raised from 53.7 to 55.1 per cent. The proportion of bone has been changed from 17.7 to 16.4 per cent, and the offal from 27.1 to 24.6 per cent in Ration B and 25.3 per cent in Ration C. It is also of interest to ob-

serve that of the three rations C tends to lower the amount of fat deposited in the body cavity, although it is higher than in the ranger birds.

TABLE 11.—*Chemical analysis of edible portion of young chickens, before and after fleshing.*

	Ration.	Total edible portion excluding crude gizzard fat.			Crude gizzard fat.	
		Water.	Fat.	Protein.	Water.	Fat.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Before fleshing		70.93	8.51	19.51	25.48	68.93
After fleshing	A	65.88	14.68	18.29	15.33	82.18
	B	65.43	15.73	18.17	16.43	81.08
	C	67.34	13.57	18.26	19.26	78.27

The rapidly formed flesh is relatively richer in fat than the flesh produced under more normal conditions. The protein content is slightly lowered as compared with the ranger. It is quite possible that this change in protein content is due as much to the lack of exercise as to the diet, an assumption borne out by the fact that the protein content is practically the same on all three rations. The water content of the quickly produced flesh is lower than that built up under the normal environment. Apparently the fat which has been forced into the tissue has partly replaced the water of the ranger bird. If we assume that the flesh of the chicken which exercises and lives on the mixed diet of a farm bird has a normal composition, Ration C, fed in captivity, results in a less abnormal flesh than either Ration A or Ration B.

From the viewpoint of eating quality, both Ration B and Ration C are highly desirable. The flesh of the birds fed Ration C is more tender and the flavor is excellent. The removal of the feathers was more difficult than in the case of the birds fed on Rations A and B. This is invariably the case with soft meated as compared with ranger birds and increases with the tenderness of the skin and flesh.

ECONOMIC ADVANTAGE OF FLESHING BROILERS AT THE PACKING HOUSE.

These results show that young chickens can be made to gain more than one-third of their initial weight as ranging birds by confining them in suitable quarters and feeding to them a suitable ration for a period of two weeks. Considered on the basis of the individual small broiler, or even on the basis of the young cockerels of the farm flock, the resultant number of pounds of additional foodstuff is not great. Considered, however, on the basis of the usual carload—which is the commercial unit of dressed poultry—the figures assume a new significance. Table 12 gives a résumé of the gains in weight, the dressing losses, and the increase in foodstuff to the consumer on the 20,000-pound carload of dressed poultry.

TABLE 12.—*Gain in live and chilled weights, total edible portion, protein, and fat produced by fleshing 1 carload (chilled weight, 20,000 pounds) of farm (unfleshed) broilers for 14 days.*

	Farm.	Ration A.	Ration B.	Ration C.
Initial live weight (pounds)	22,346.4	22,346.4	22,346.4	22,346.4
Gain in live weight by fleshing (per cent of initial live weight)	0	5.00	30.36	34.97
Final live weight (pounds)	22,346.4	23,463.7	29,130.8	30,160.9
Gain in live weight (pounds)	.....	1,117.3	6,784.4	7,814.5
Total shrinkage (killing, dressing, chilling) (per cent of final live weight)	10.50	10.46	10.67	10.92
Chilled weight (pounds)	20,000.0	21,009.4	26,022.5	26,867.3
Total edible portion (meat, skin, edible viscera) (per cent of chilled weight)	53.7	53.8	55.2	55.1
Weight of total edible portion (pounds)	10,740.0	11,303.1	14,364.4	14,803.9
Protein (per cent of total edible portion)	19.51	18.29	18.17	18.26
Fat (per cent of total edible portion)	8.51	14.68	15.73	13.57
Weight of protein in total edible portion (pounds)	2,095.4	2,067.3	2,610.0	2,703.2
Weight of fat in total edible portion (pounds)	914.0	1,659.3	2,259.5	2,008.9
Crude gizzard fat (per cent of chilled weight)	1.5	3.8	3.9	3.2
Weight of crude gizzard fat (pounds)	300.0	798.4	1,014.9	859.8
Fat in crude gizzard fat (per cent)	68.93	82.18	81.08	78.27
Fat in crude gizzard fat (pounds)	206.8	656.1	822.9	673.0
Gain on 1 carload by fleshing:				
Chilled weight (pounds)	.....	1,009.4	6,022.5	6,867.3
Total edible portion (pounds)	.....	563.1	3,624.4	4,063.9
Protein of total edible portion (pounds)	.....	−28.1	+514.6	+607.8
Fat of total edible portion (pounds)	.....	745.3	1,345.5	1,094.9
Fat of crude gizzard fat (pounds)	.....	449.3	616.1	466.2
Total fat (in total edible portion and crude gizzard fat) (pounds)	.....	1,194.6	1,961.6	1,561.1
Total gained fat deposited in total edible portion (per cent)	.....	62.39	68.59	70.14
Crude gizzard fat gained (pounds)	.....	498.4	714.9	559.8

Table 12 shows that the gain in weight on one carload by fleshing with Ration C amounts to about 6,867 pounds, or 845 pounds more than was gained by Ration B. It is this gain in weight which makes the properly managed feeding station profitable to the poultry packer. The gain in edible meat of high quality amounts in round numbers to 4,064 pounds with Ration C, and to 3,624 pounds with Ration B, an important consideration to the consumer. This total gain to the consumer is divided, in Ration C chickens, into 608 pounds of protein and 1,561 pounds of fat, 1,095 pounds of the fat being deposited in the muscle tissue and skin. It is also noteworthy that with Ration C, 70.14 per cent of the fat gained by fleshing is deposited in the edible portion of the bird rather than in the body cavity, a gain of nearly 2 per cent, as compared with Ration B.

SUMMARY.

Rations composed of corn meal and water (A), corn meal and buttermilk (B), and corn meal, distillers' grains and buttermilk (C) have been fed to young chickens of less than 3 pounds in weight as they came from the farm with the following results:

(1) Ration A, after a two weeks' feeding period, gave a gain of 5 per cent of the initial weight.

Ration B, after a two weeks' feeding period, gave a gain of 30.41 per cent of the initial weight.

Ration C, after a two weeks' feeding period, gave a gain of 35.01 per cent of the initial weight.

(2) The amount of wet feed required to produce a gain of 1 pound of flesh in 14 days was as follows:

Ration A, 43.91 pounds (grain, 19.54 pounds).
Ration B, 8.88 pounds (grain, 3.55 pounds).
Ration C, 7.91 pounds (grain, 3.16 pounds).

(3) The rate of gain with ration A was irregular. The rate of gain with Ration B decreased slightly toward the end of the feeding period. The gain with Ration C was practically uniform.

(4) The amount of feed required to produce 1 pound of flesh during 4, 8, 11, and 14 days, respectively, varied widely with Ration A. With Ration B there was a slight progressive increase in the amount of food required per pound of gain as the feeding progressed, while with Ration C the amount required for each period was practically constant.

(5) The loss of weight due to the removal of blood and feathers and the evaporation of moisture from the flesh while chilling 24 hours in air at 32° F. amounts to nearly 11 per cent of the live weight. The birds from the farm and the birds on Ration A lost about the same weight, while birds on Rations B and C lost a little more. The actual result in weight to the packer as compared with the farm weight was for Ration A, −5.98 per cent, for Ration B, +16.50, and for Ration C, +20.27 per cent.

(6) The highest and cheapest gains were made by birds having an initial weight of 2 pounds or less.

(7) By feeding Rations B or C the total edible portion of the birds is increased from 53.7 to 55.2 per cent. Rations A and B tend to deposit more fat in the body cavity than does Ration C.

(8) If every 20,000-pound carload of broilers slaughtered as they come from the farm should be fed for 2 weeks on Ration C, the gain in weight to the packer would average 6,867 pounds. The gain in edible meat would amount to 4,064 pounds, of which approximately 608 pounds are protein and 1,561 pounds are fat.

(9) Chicken flesh increased at the rate and under the conditions indicated differs from that produced by the bird when unconfined, chemically, physiologically, and in its eating quality. It is for food purposes only; hence the deductions drawn on the basis of the experiments reported must not be applied to birds intended for egg production or for breeding stock, or to the feeding of birds ranging on the farm.

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